Communications Operating Concept and Requirements for the Future Radio System

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CAASD

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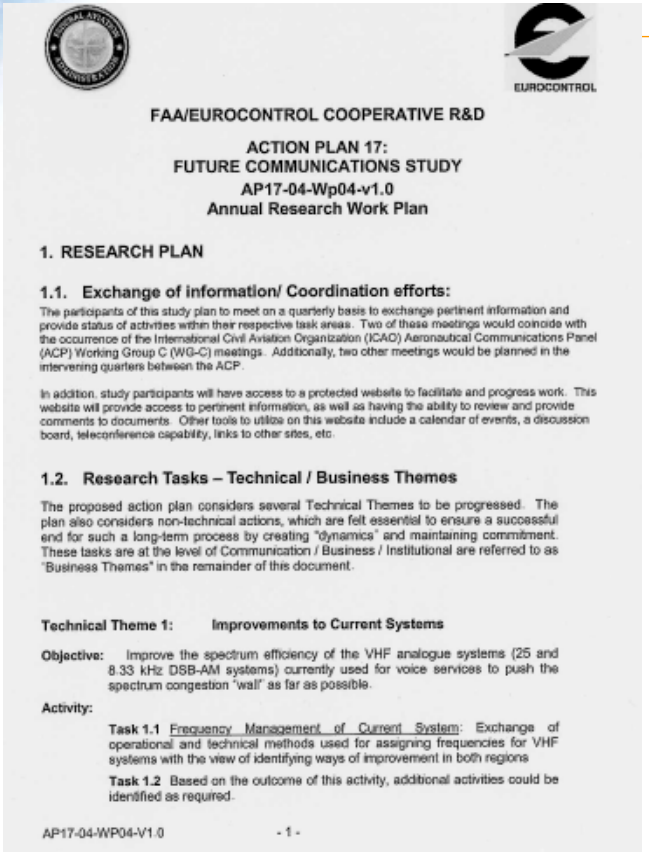
Future Communications Study



FAA/EUROCONTROL COOPERATIVE R&D

ACTION PLAN 17:
FUTURE COMMUNICATIONS STUDY
AP17-04-Wp04-v1.0
Annual Research Work Plan

1. RESEARCH PLAN

1.1. Exchange of information/ Coordination efforts:

The participants of this study plan to meet on a quarterly basis to exchange pertinent information and provide status of activities within their respective task areas. Two of these meetings would coincide with the occurrence of the International Civil Aviation Organization (ICAO) Aeronautical Communications Panel (ACP) Working Group C (WG-C) meetings. Additionally, two other meetings would be planned in the intervening quarters between the ACP.

In addition, study participants will have access to a protected website to facilitate and progress work. This website will provide access to pertinent information, as well as having the ability to review and provide comments to documents. Other tools to utilize on this website include a calendar of events, a discussion board, teleconference capability, links to other sites, etc.

1.2. Research Tasks – Technical / Business Themes

The proposed action plan considers several Technical Themes to be progressed. The plan also considers non-technical actions, which are felt essential to ensure a successful end for such a long-term process by creating "dynamics" and maintaining commitment. These tasks are at the level of Communication / Business / Institutional are referred to as "Business Themes" in the remainder of this document.

Technical Theme 1: Improvements to Current Systems

Objective: Improve the spectrum efficiency of the VHF analogue systems (25 and 8.33 kHz DSB-AM systems) currently used for voice services to push the spectrum congestion "wall" as far as possible.

Activity:

Task 1.1 Frequency Management of Current System: Exchange of operational and technical methods used for assigning frequencies for VHF systems with the view of identifying ways of improvement in both regions

Task 1.2 Based on the outcome of this activity, additional activities could be identified as required.

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Objectives

- Provide communications capacity for Air Traffic Management through 2030
- Allow a realistic transition for service providers and airspace users
- Support ATS and AOC communications for safety and regularity of flight
- Address VHF spectrum depletion in both Regions
- Investigate multi-mode avionics for implementation

International Coordination through ICAO Aeronautical Communications Panel (ACP) Working Group-C

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Future Communications Study

- **Cooperative U.S. and Eurocontrol R&D**
  - Goal: Investigation of new technologies for future global air-ground communications system
  - Industry investment will be necessary to achieve
    - Generating interest is the goal of today's presentation
- **Three U.S. working groups**
  1. Operating Concept and Requirements
  2. Requirements, Technology, and Transition Analysis
  3. Technology Assessment
- **Group 1 Product: "Communications Operating Concept and Requirements (COCR)"**
  - Initial (18 January 2005), Final (September 2005)

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COCR Approach

- **Combined team of operational & technical experts from FAA, EUROCONTROL, and NASA**
- **Two phased approach supporting AP-17**
  - **Develop Initial COCR support technology pre-screening. Completed 1/05.**
    - Literature search for 2015 – 2030 operating concepts
    - Understand/Define/Describe operational services
    - Establish traffic characteristics and loading
    - Internal FAA/EUROCONTROL team review
    - Public release April 2005.
  - **Develop Final COCR to support technology selection. Scheduled completion 12/05.**
    - Continue refinement of Initial COCR
    - Increase validity of requirements by modeling
    - Include operational safety and performance requirements
    - Identify missing needs e.g. SWIM, Net Centric Ops, JPDO, etc.
  - **Gain upper management FAA/industry consensus**

ICOCR on FAA website: http://www.nas-architecture.faa.gov/cats/

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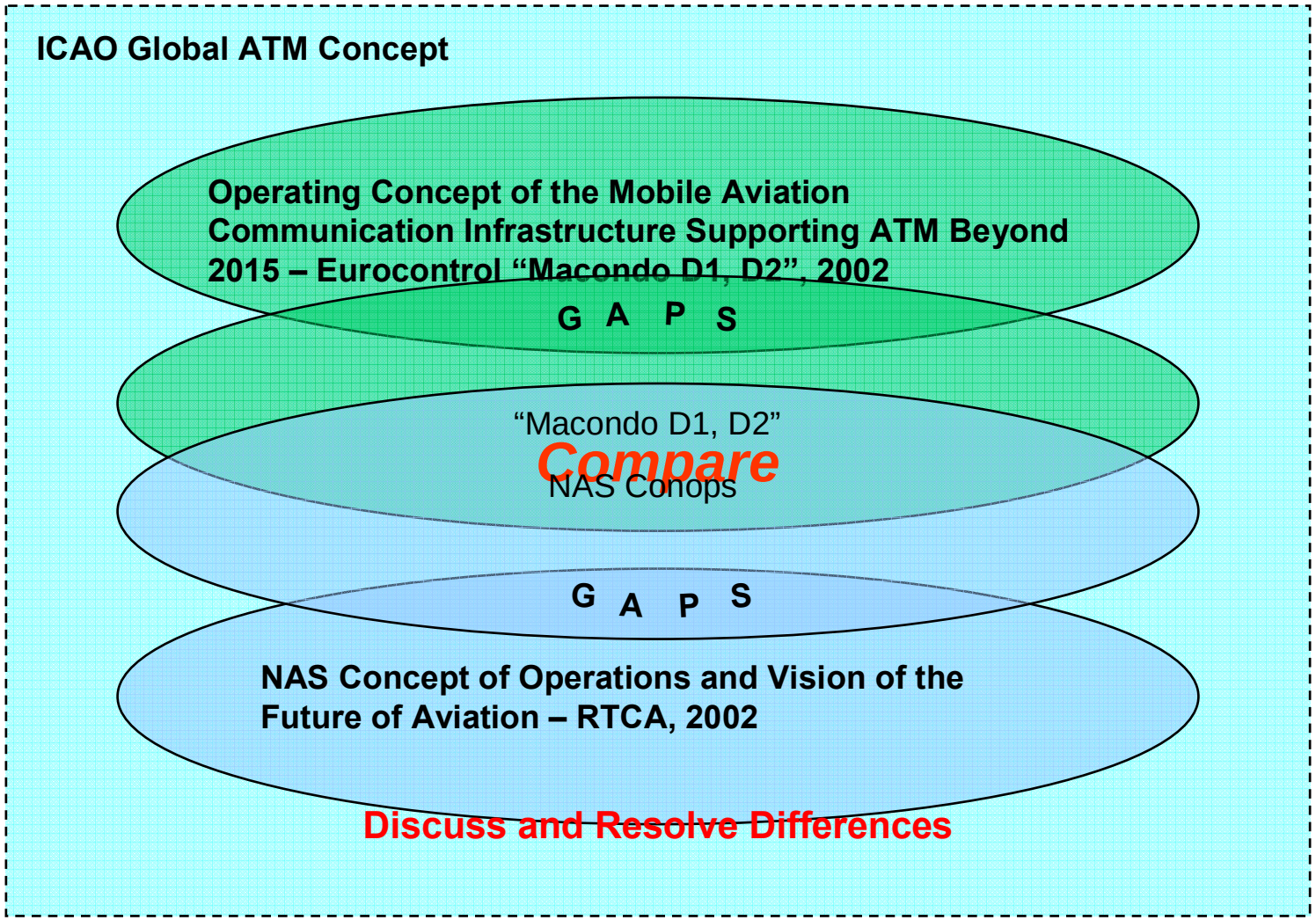
Process Step 1: Review Operating Concepts and Perform a Gap Analysis



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Process Step 2: Identify Services, Operational Environment, and Performance Requirements

NAS/RTCA

- Safety and Performance Requirements Standard for Air Traffic Data Link Services in Continental Airspace (DO-290)
- Plans and Principles for the Implementation of Aeronautical Data Link System (DO-287)
- Interoperability Requirements Standard for ATN Baseline 1 (DO-280)
- Next Generation Air/ Ground Communications (NEXCOM) Principles of Operations (DO-274)
- Joint Planning and Development Office (JPDO) Concepts and Plans

Operational Services and Environmental Definition (OSED)

Simplify and Add Safety and Performance Requirements

Communications Operating Concepts and Requirements (COCR)

EUROCONTROL

- Safety and Performance Requirements Standard for Air Traffic Data Link Services in Continental Airspace (ED-120)
- Aircraft in the Future Air Traffic Management System (AFAS,WP1.4)
- Other Projects/Concepts:
  - LINK 2000+
  - CASCADE
  - COOPATS

Other Sources

- MITRE
- ICAO
- US/European Aviation Industry Documents

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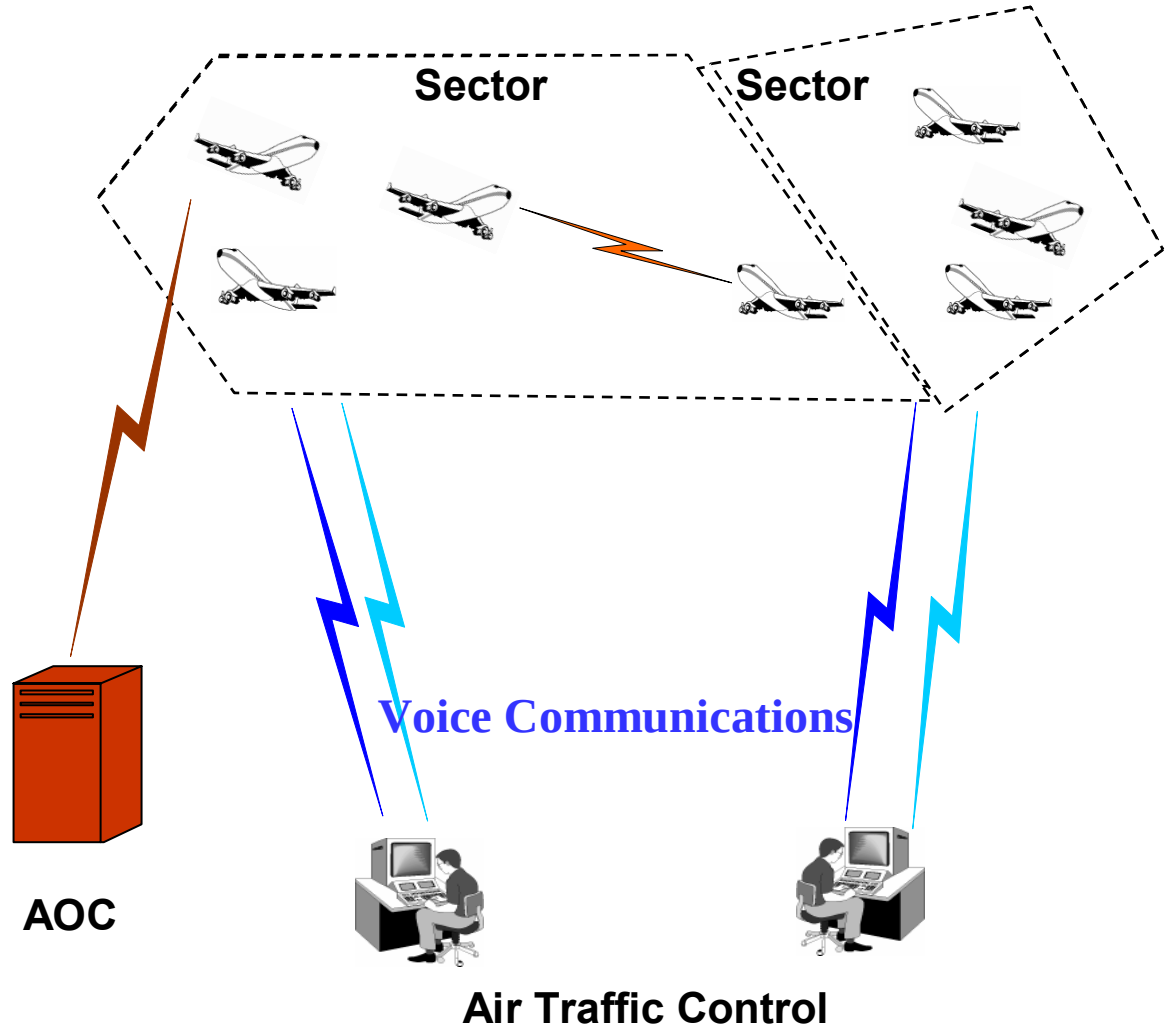
Emerging Operating Concepts

- Use of Data Links to augment/supplant voice communications
- Flexible Airspace/ Reconfigurable Sectors
- Air-Air Information Exchange
- AOC air/ground communication



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COCR Content Overview

- **Trends for voice & data evolution with scenarios that use the services**
- **25 ATS, 21 AOC operational services defined**
- **Contains operational loading requirements**
- **In 2015, data services replace some voice services in various regional-specific implementations**
- **By 2030**
  - Managed and unmanaged airspace
  - 4-D trajectory negotiations
  - Autonomous operations
- **Air traffic increase to 2.5–3 times current, spread over less dense periods**
  - Includes “micro-jets” & UAV’s

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Operational Services

- **Air Traffic Services**
  - Controller/Flight Crew Communications
    - ATC Voice and ATC Data
  - Automated Downlink of Airborne Parameters
    - ATC Data
  - Flight Information Service
    - FIS-Broadcast
  - Traffic and Surveillance
    - ADS-Broadcast
  - Emergency and Ancillary
  - Communications Management
- **Aeronautical Operational Control**
  - AOC Safety Data
  - AOC Advisory Data

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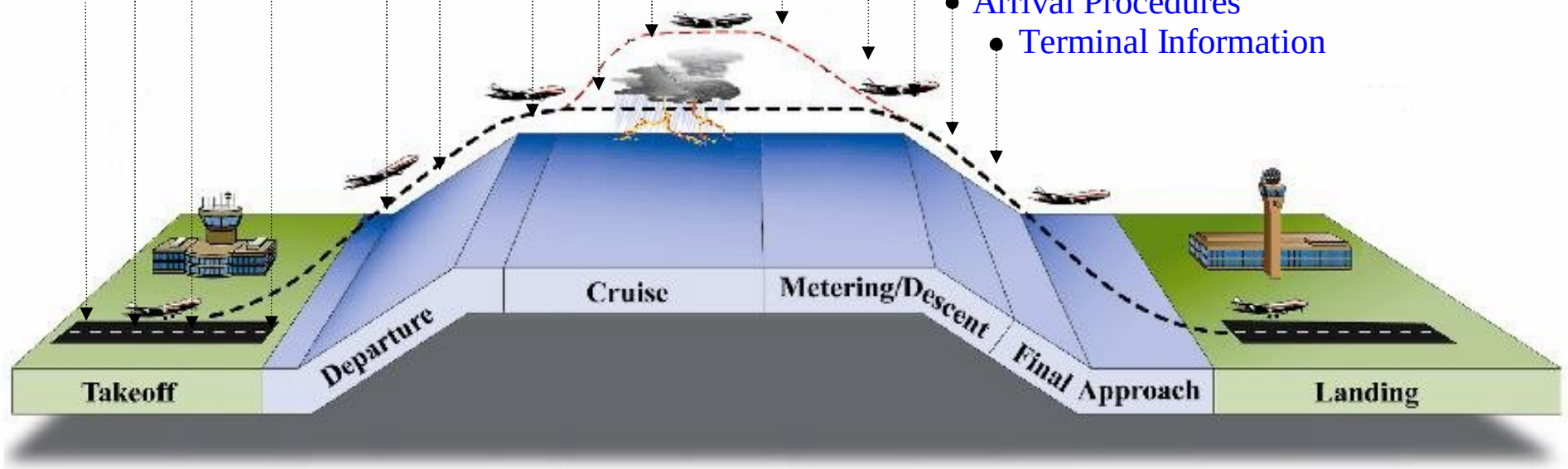
Services Supporting the Flight Profile

- Departure Clearance & Revisions
- AOC Flight Plan Exchanges
- Airport Information (ATIS)
- Taxi Clearance
- Transfer of Communication
- Separation Assurance
- ATS-Initiated Routes / Altitudes
- User-Preferred Routes / Altitudes
- NAS Status Information
- Aircraft State
- Conformance / Intent
- Arrival Metering
- Arrival Procedures
- Terminal Information

Common Operations
Primarily En Route
Primarily Terminal



COCR Summary

- Concepts and services agreed with EUROCONTROL except for timing
- Airspace of today evolves to 2030 consisting of two classes:
  - Managed Airspace: 4-D trajectory management is the norm. Shared separation responsibility for specific operations.
  - Unmanaged Airspace: Separation responsibility transferred for all operations
- Difference between 2015 & 2030 is the evolution away from voice as primary to data as primary
- Bulk of data services in 2015 support evolution away from voice. In 2030, Data is primary. New services are supported by automation tools & cannot be done via voice. Recovery via voice in the event of failure is questionable.
- Coordination of document outside of FCS Team to proceed through ATMAC, JPDO, and ICAO ACP / ATMRPP to assess global applicability

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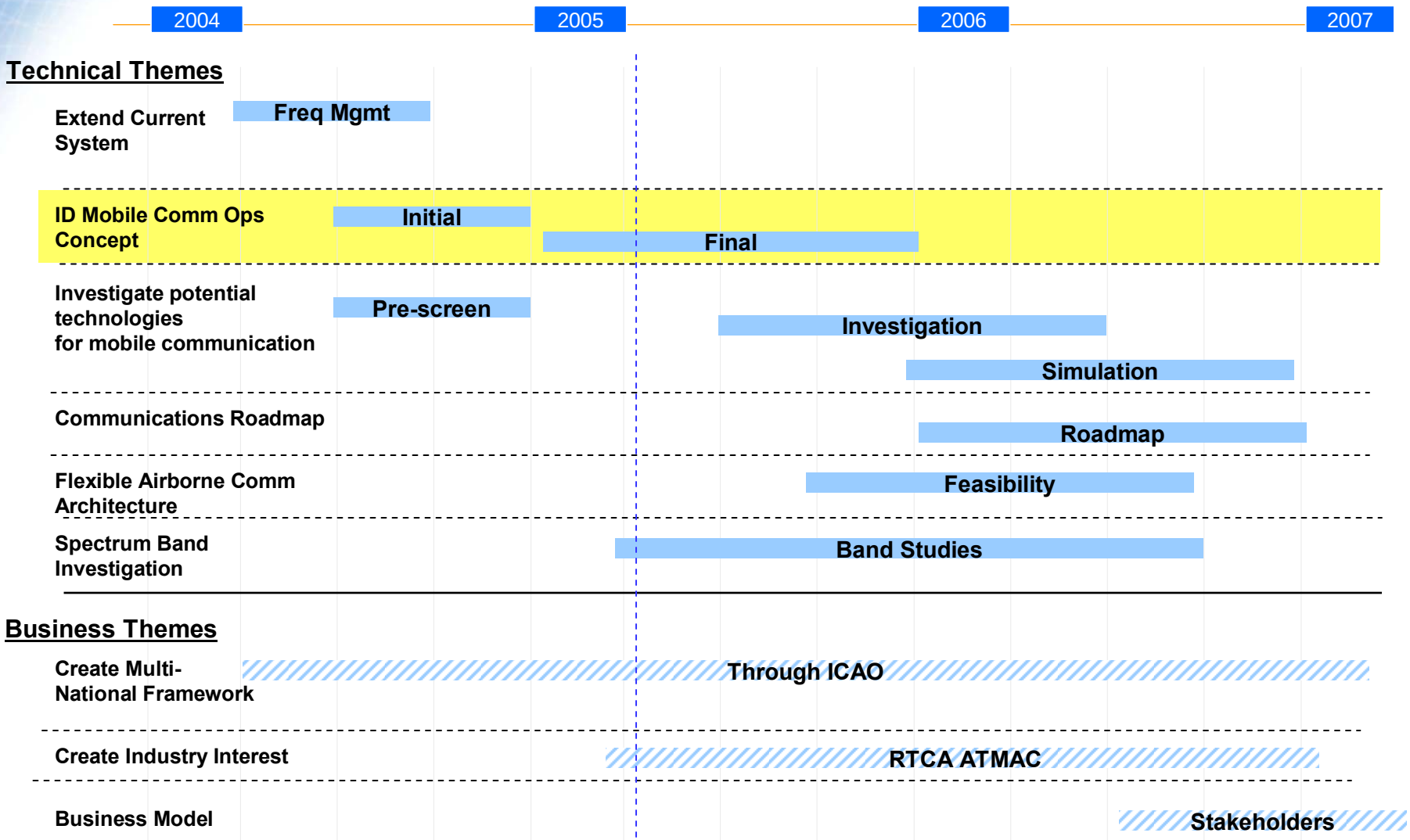
Backup Material

ICAO Action Plan 17
Future Communications Study



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